

Claims

- [c1] A method of controlling an automotive vehicle having a turning radius comprising:
- determining a steering wheel angle;
 - determining a steering wheel direction;
 - determining a steering wheel angular rate and
 - applying brake-steer as a function of steering wheel angle, steering wheel angular rate and steering wheel direction.
- [c2] A method as recited in claim 1 further comprising determining a vehicle speed and wherein applying brake-steer comprises applying brake-steer as a function of steering wheel angle, steering wheel rate, steering wheel direction and said vehicle speed.
- [c3] A method as recited in claim 1 wherein the steering wheel direction comprises an increasing direction and a decreasing direction wherein applying brake-steer comprises applying brake-steer using a first boost curve in a first direction and applying brake-steer using a second boost curve in a second direction wherein the first boost curve is different than the second boost curve.

- [c4] A method as recited in claim 3 wherein the first boost curve comprises a non-linear-boost curve.
- [c5] A method as recited in claim 3 wherein the first boost curve increases brake-steer at a first rate for a first period of time, increases brake-steer at a second rate for a second period of time, wherein the second rate is greater than the first rate, and increases brake-steer at third rate for a third period of time, wherein the third rate is less than the second rate.
- [c6] A method as recited in claim 3 wherein the second boost curve comprises a non-linear-boost curve.
- [c7] A method as recited in claim 3 wherein the second boost curve decreases brake-steer at a first rate for a first period of time and decreases brake-steer at a second rate for a second period of time, wherein the second rate is less than the first rate.
- [c8] A method as recited in claim 1 wherein applying brake-steer reduces the turning radius of the vehicle.
- [c9] A method as recited in claim 8 wherein applying brake-steer comprises applying at least one brake at a first wheel to reduce the vehicle turning radius.
- [c10] A method as recited in claim 9 wherein applying brake-

steer comprises applying an increased drive torque to a second wheel.

- [c11] A method as recited in claim 1 further comprising detecting a parking mode, and applying brake-steer as a function of the parking mode, steering wheel angle, steering wheel angular rate and steering wheel direction.
- [c12] A method of controlling an automotive vehicle comprising:
 - detecting a parking mode;
 - in the parking mode, when the steering wheel angle is increasing applying brake-steer using a first boost curve;
 - and
 - when the steering wheel angle is decreasing applying brake-steer using a second boost curve different than the first boost curve.
- [c13] A method as recited in claim 12 wherein applying brake-steer comprise a function of a steering wheel angle, a steering wheel angular rate and a steering wheel direction.
- [c14] A method as recited in claim 12 further comprising determining a vehicle speed and wherein applying a brake-steer comprises applying brake-steer as a function of a steering wheel angle, a steering wheel rate, a steering

wheel direction and a vehicle speed.

- [c15] A method as recited in claim 12 wherein the first boost curve comprises a non-linear-boost curve.
- [c16] A method as recited in claim 12 wherein the first boost curve increases brake-steer at a first rate for a first period of time, increases brake-steer at a second rate for a second period of time, wherein the second rate is greater than the first rate and increases brake-steer at third rate for a third period of time wherein the third rate is less than the second rate.
- [c17] A method as recited in claim 12 wherein the second boost curve comprises a non-linear-boost curve.
- [c18] A method as recited in claim 12 wherein the second boost curve decreases brake-steer at a first rate for a first period of time and decreases brake-steer at a second rate for a second period of time, wherein the second rate is less than the first rate.
- [c19] A method as recited in claim 12 wherein applying brake-steer comprises applying at least one brake at a first wheel to reduce a vehicle turning radius of the vehicle; and
simultaneously with the step of applying at least one brake, applying drive torque to a second wheel.

- [c20] A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed.
- [c21] A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a steering wheel angle.
- [c22] A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed and a steering angle.
- [c23] A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a driver-actuated switch.
- [c24] A method as recited in claim 12 further comprising determining a surface μ , wherein applying brake-steer comprises applying brake-steer in response to the surface μ to reduce a vehicle turning radius.
- [c25] A method as recited in claim 12 further comprising determining a vehicle load, wherein applying brake-steer comprises applying brake-steer at a first wheel in response to the vehicle load to reduce a vehicle turning radius.
- [c26] A method as recited in claim 12 further comprising de-

termining a throttle position, wherein applying brake-steer comprises applying brake-steer in response to the throttle position to reduce a vehicle turning radius.

[c27] A method as recited in claim 12 wherein applying brake-steer comprises applying at brake-steer as a function of an anti-lock brake system.

[c28] A method as recited in claim 12 wherein applying brake-steer comprises applying brake-steer as a function of a traction control system.

[c29] A method of controlling an automotive vehicle having a turning radius comprising:
detecting a parking mode;
in the parking mode, applying a first positive torque to a first driven wheel; and
simultaneously with the step of applying a first positive torque, applying a second positive torque greater than the first positive torque to a second wheel so that the turning radius of the vehicle is reduced.

[c30] A method as recited in claim 29 further comprising determining a brake pressure request, and discontinuing the steps of applying a first positive torque and a second positive torque when said request is greater than a pre-determined threshold.

- [c31] A method as recited in claim 29 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed.
- [c32] A method as recited in claim 29 wherein detecting a parking mode comprises detecting a parking mode in response to a steering wheel angle.
- [c33] A method as recited in claim 29 wherein detecting a parking mode comprises detecting a parking mode in response to a map correlating vehicle speed and a steering wheel rate to a parking/non-parking condition.
- [c34] A method as recited in claim 29 wherein detecting a parking mode comprises activation of a switch mechanism.
- [c35] A method as recited in claim 29 wherein applying a second positive torque comprises applying the second positive torque as a function of a traction control system.
- [c36] A method as recited in claim 29 further comprising switching from a 4x4 mode into a 4x2 mode when applying the second positive torque.
- [c37] A method as recited in claim 29 wherein determining a parking mode comprises determining a parking mode in response to a steering system pressure.

- [c38] A method of enhancing the turning ability of a vehicle having a steering mechanism comprising:
determining a driver selectable mode;
generating a steering enhance signal in response to the driver selectable mode; and
actuating at least one brake on one side of the vehicle in response to said steering enhance signal to enhance the turning radius achieved by the steering mechanism.
- [c39] A method as recited in claim 38 wherein determining a driver selectable mode comprises determining a driver selectable mode in response to a switch mechanism.
- [c40] A method as recited in claim 38 wherein actuating comprises actuating a first brake.
- [c41] A method as recited in claim 38 wherein actuating comprises actuating a first brake and a second brake.
- [c42] A method as recited in claim 38 wherein actuating comprises actuating a first brake at a first wheel and further comprising applying a positive engine torque at a second wheel.
- [c43] A method as recited in claim 38 wherein activating a least one brake comprises activating at least one brake in response to an anti-lock brake system.

- [c44] A method of controlling an automotive vehicle having a turning radius comprising:
detecting a parking mode;
detecting a transfer case mode;
applying brake-steer in response to a parking mode and a transfer case mode.
- [c45] A method as recited in claim 44 wherein applying brake-steer comprises proportioning front wheel and rear wheel brakes based on the transfer case mode.
- [c46] A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed.
- [c47] A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a steering wheel angle.
- [c48] A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a map correlating vehicle speed and a steering wheel rate to a parking/non-parking condition.
- [c49] A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a driver-actuated switch.

- [c50] A method as recited in claim 44 wherein applying brake-steer comprises applying an increased drive torque to a second wheel relative to a first wheel.
- [c51] A method as recited in claim 44 wherein applying brake-steer comprises applying brake-steer to a front wheel.
- [c52] A method as recited in claim 44 wherein applying brake-steer comprise proportioning brake-steer between a front wheel and a rear wheel.
- [c53] A vehicle comprising:
means to determine a parking mode; and
a controller coupled to the means to determine a parking mode, said controller programmed to, in the parking mode, apply a first positive torque to a first driven wheel and simultaneously with applying the first positive torque, apply a second positive torque greater than the first positive torque to a second wheel so that the turning radius of the vehicle is reduced.
- [c54] A vehicle as recited in claim 53 further comprising a traction control system, wherein the first positive torque is a function of the traction control system.
- [c55] A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises detecting a parking

mode in response to a vehicle speed.

- [c56] A vehicle as recited in claim 53 the means to determine a parking mode comprises detecting a parking mode in response to a steering wheel angle.
- [c57] A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises detecting a parking mode in response to a vehicle speed and a steering angle.
- [c58] A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises detecting a parking mode in response to a driver-actuated switch.
- [c59] A vehicle as recited in claim 53 further comprising a transfer case having a 4x2 mode and a 4x4 mode, said controller selecting 4x2 mode when applying a second positive torque.
- [c60] A method as recited in claim 53 wherein the vehicle comprises an open differential or a limited slip differential.
- [c61] A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises a steering system pressure sensor.